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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/301,961	04/29/1999	ANTHONY P. PEIRCE	56.468	6283

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SCHLUMBERGER TECHNOLOGY CORPORATION
IP DEPT., WELL STIMULATION
110 SCHLUMBERGER DRIVE, MD1
SUGAR LAND, TX 77478

EXAMINER
DAY, HERNG DER

ART UNIT	PAPER NUMBER
2128	18

DATE MAILED: 05/04/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

PTO-90C (Rev. 10/03)

Office Action Summary	Application No.		Applicant(s)	
	09/301,961		PEIRCE ET AL.	
	Examiner		Art Unit	
	Herng-der Day		2128	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE <u>3</u> MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.
- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *16 March 2004*.

2a)☐ This action is **FINAL**.   2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-4,6-10 and 12-19* is/are pending in the application.

    4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-4,6-10 and 12-19* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *16 March 2004* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

    Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

    a)☐ All   b)☐ Some * c)☐ None of:

      1.☐ Certified copies of the priority documents have been received.

      2.☐ Certified copies of the priority documents have been received in Application No. _____.

      3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

    * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application (PTO-152)

6) ☐ Other: _____.

DETAILED ACTION

1.   This communication is in response to Applicants' RCE (paper # 15) and Response (paper

16) to Office Action dated September 11, 2003 (paper # 11), mailed March 11, 2004 and

received by PTO March 16, 2004.

1-1.   A request for continued examination under 37 CFR 1.114, including the fee set forth in

37 CFR 1.17(e), was filed in this application after final rejection. Since this application is

eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e)

has been timely paid, the finality of the previous Office Action has been withdrawn pursuant to

37 CFR 1.114. Applicants' submission filed on November 11, 2003, and resubmitted on March

11, 2004, has been entered.

1-2.   Claims 1, 3, 6-9, and 12 have been amended; claims 1-4, 6-10, and 12-19 are pending.

1-3.   Claims 1-4, 6-10, and 12-19 have been examined and rejected.

1-4.   The indicated allowability of claims 3-4, 6-10, and 12 is withdrawn in view of the newly

discovered issues related to the rejections under 35 U.S.C. 112, first and/or second paragraphs.

Information Disclosure Statement

2.   The Examiner requests again the detailed information about the FracCADE package

referred to in the specification and drawings, including the application of a mesh of elements and

the element updating algorithm, because it appears to be reasonably necessary to the examination

of this application and cannot be located.

As described in page 2 of the reference document CC submitted with the information

disclosure statement (paper # 2), "FracCADE's technology can help you with simple reservoirs

and more complex isolated multiple-layer reservoirs" has been disclosed in section "The Power

to Design". Also disclosed in page 1 is that FracCADE will "Use the pseudo three-dimensional

(P3D) hydraulic fracturing simulator". It appears that the FracCADE discloses the simulation of

a multiple-layer reservoir. However, in page 3, lines 10-20, of the specification, Applicants

argue that the P3D method cannot accurately represent fracture geometry in more complex

treatments that involve multiple geological layers underground. It is also noted that the

FracCADE package is used to input data and output results as shown in FIG. 18 to FIG. 20.

3.   The Examiner requests the detailed information about the "well known commercially

available simulator" as admitted by Mr. Eduard Siebrits in the Affidavit Under 37 CFR 1.132

(paper # 17) because it appears to be reasonably necessary to the examination of this application

and cannot be located.

As shown and described in Figure 3, page 5/7 of the Affidavit Under 37 CFR 1.132

(paper # 17), "The MLAYER result is due to Peirce/Siebrits, and the FLAC result is obtained

from running a well known commercially available simulator, based on a (much slower) finite

difference method, that matches MLAYER". In other words, the "well known commercially

available simulator" has been used by Applicants to show matching result to the instant patent

application, however, it has not been disclosed by Applicants in the submitted Information

Disclosure Statement.

4.   The Examiner requests the detailed information about the "Lin and Keer three layer test"

as compared by Mr. Eduard Siebrits in the Affidavit Under 37 CFR 1.132 (paper # 17) because it

appears to be reasonably necessary to the examination of this application and cannot be located.

As shown and described in Figure 5, page 6/7 of the Affidavit Under 37 CFR 1.132

(paper # 17), "MLAYER3D results are from a PL3D Peirce/Siebrits simulator, and Lin & Keer

results are published in the open literature, and are considered to be accurate" and "MLAYER3D

results closely match the Lin & Keer ones in all cases". In other words, the "Lin and Keer three

layer test" has been used by Applicants to show matching results to the instant patent application,

however, it has not been disclosed by Applicants in the submitted Information Disclosure

Statement.

Specification

5.   The amendment filed March 11, 2004, is objected to under 35 U.S.C. 132 because it

introduces new matter into the disclosure. 35 U.S.C. 132 states that no amendment shall

introduce new matter into the disclosure of the invention. The amended material, which is not

supported by the original disclosure, is as follows:

> (1) Amended specification at page 4, lines 1-3, as described in page 3/17 of paper # 16.
>
> Applicant is required to cancel the new matter in the reply to this Office Action.

6.   The amended specification is objected to because of the following informalities:

Appropriate correction is required.

6-1.   It appears that "$s_{ij,j}$", as described in line 13 of substitute page 22, should be "$\sigma_{ij,j}$".

6-2. It is unclear what it means, for example, "$?\, u_i\, /\, ?x_j.$", as described in line 16 of substitute

page 22.

6-3. It appears that "bi", as described in line 8 of substitute page 25, should be "b_i".

Claim Rejections - 35 USC § 112

7. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making
> and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it
> pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode
> contemplated by the inventor of carrying out his invention.

8. Claims 1-4, 6-10, and 12-19 are rejected under 35 U.S.C. 112, first paragraph, as

containing subject matter which was not described in the specification in such a way as to enable

one skilled in the art to which it pertains, or with which it is most nearly connected, to make

and/or use the invention.

8-1. As described in the substitute page 25, "the α_j^l are the roots of the characteristic equation

for the system of ordinary differential equations". However, without undue experimentation, it is

unclear for one skilled in the art why α_j is layer independent as shown in equation (9) while all

other variables are layer dependent in a multiplayer environment.

8-2. Independent claim 6 recites the limitation, "wherein the elements are capable of being

only partially active, further wherein the recalculation of fully active elements is not required

during determination of said first set of values" in step (d). Claims 4, 7-10, and 12 recite

identical or equivalent limitation as mentioned above. In other words, only partially active

elements are updated. Therefore, without undue experimentation, it is unclear for one skilled in

the art how to check for global mass balance, as described in lines 14-18 of page 13, because only partially active elements have been updated.

8-3.   Independent claim 8 recites the limitation, "the first data set comprising one or more of the following: time history of fluid volumes for pumping, time history of proppant volumes for pumping, fluid properties, proppant properties if the fluid contains proppant, and logs". When the first data set comprising only the data of, for example, time history of fluid volumes, and no data about any properties, it satisfied the "one or more" limitation. However, without undue experimentation, it is unclear for one skilled in the art how to determine dimensions of a hydraulic fracture by values computed by manipulating only the data of "time history of fluid volumes for pumping" using equations comprising hydraulic fracturing relationships.

8-4.   Independent claim 9 recites the limitation, "the first data set comprising one or more of the following data points obtained during step (a): time history of fluid volumes for pumping, time history of proppant volumes for pumping, fluid properties, proppant properties if the fluid contains proppant, and logs". When the first data set comprising only the data of, for example, time history of fluid volumes, and no data about any properties, it satisfied the "one or more" limitation. However, without undue experimentation, it is unclear for one skilled in the art how to determine dimensions of a hydraulic fracture by values computed by manipulating only the data of "time history of fluid volumes for pumping" using equations comprising hydraulic fracturing relationships.

9.   The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

10.   Claim 3, 6-9, and 12 are rejected under 35 U.S.C. 112, second paragraph, as being

indefinite for failing to particularly point out and distinctly claim the subject matter which

applicant regards as the invention.

10-1.   Claim 3 recites the limitations "using a mesh of elements" and "the elements may be only

partially active" in step (d) of the claim. It is vague and indefinite because it is unclear whether

it means all the elements are only partially active or some elements are partially active. Besides,

the limitation does not exclude the possibility that the elements are either fully active or inactive

and no element is partially active.

10-2.   Claims 6, 7, and 12 recite the limitation "the recalculation of fully active elements" in

step (d) of each claim. There is insufficient antecedent basis for this limitation in each claim.

10-3.   Claims 8 and 9 recite the limitation "the recalculation of fully active elements" in step (e)

of each claim. There is insufficient antecedent basis for this limitation in each claim.

Claim Interpretation

11.   Independent claim 3 recites the limitation "the elements may be only partially active" in

step (d) of the claim, which is vague and indefinite as discussed in section **10-1** above. For the

purpose of claim examination with the broadest reasonable interpretation, the Examiner will

interpret "the elements may be only partially active" as "the elements are fully active, inactive,

or partially active".

Claim Rejections - 35 USC § 103

12.   The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all

obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in
> section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are
> such that the subject matter as a whole would have been obvious at the time the invention was made to a person
> having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the
> manner in which the invention was made.

13.   Claims 1-3 and 13-19 are rejected under 35 U.S.C. 103(a) as being unpatentable over

"GOHFER Grid Oriented Hydraulic Fracture Extension Replicator", Stim-Lab, Inc. and

Marathon Oil Company, 1996 (reference document CA, paper # 2, referred to as GOHFER), in

view of Linkov et al., "An Effective Method for Multi-Layered Media with Cracks and

Cavities", International Journal of Damage Mechanics, Vol. 3, October 1994, pages 338-356

(reference document CO, paper # 2).

13-1.   Regarding claim 1, GOHFER discloses a device comprising means for storing

instructions, said instructions adapted to be executed by a processor of a computer, said

instructions when executed by the processor executing a process comprising the steps of:

       (a) obtaining a first data set, the first data set comprising: time history of fluid volumes

(fluid volume, appendix I, page 3), time history of proppant volumes (proppant conc and fluid

volume, appendix I, page 3), fluid properties (fluid properties, appendix I, page 3), proppant

properties if the fluid contains proppant (proppant properties, appendix I, page 3), and geological

properties of a layered reservoir, including layer interface locations, each layer being

characterized by an unsolved equilibrium equation (formation properties, appendix I, page 2),

       (b) providing the first data set to a computer, the computer having a processor capable of

executing instructions (processor, section 1.1, page 4), the computer further having electronic

storage means (RAM and hard disk, section 1.1, page 4) with stored equations comprising

hydraulic fracturing relationships (model, section 4.2.2, page 28),

(c) computing by said processor a first set of values by manipulating said first data set

using said stored equations (Executing, Chapter 4, pages 28-30), whereby the relations between

stress and strain in the layered reservoir are determined (stress and strain, section 3.5.7.1-

3.5.7.8),

(d) determining from said first set of values dimensions of a hydraulic fracture, the

dimensions including fracture height and length, fracture width (Fracture Size vs. Time,

appendix I, page 7) and fluid pressures (Pressure vs. Time, appendix I, page 5) as a function of

time, said hydraulic fracture intersecting at least one layer interface (displayed layers, appendix I,

page 8),

(e) converting said first set of values into a set of output data, the output data representing

fracture dimensions (Fracture Size vs. Time, appendix I, page 7) and pressures (Pressure vs.

Time, appendix I, page 5) as a function of pumping time,

(f) displaying the output data on a computer monitor (WinParse can be used as a run-time

monitor, section 5, pages 31-43).

GOHFER fails to expressly disclose that in step (c) said manipulation including solving

equilibrium equations for each layer by the use of a Fourier Transform method.

Linkov et al. propose an efficient method to solve problems for elastic multi-layered

media with cracks, which arise in rock mechanics, using the Green function by means of Fourier

transform and sweep-method. Having the Green function, one reduces the problem for damaged

layers to solution of integral equation which is defined only on surfaces of cracks and can be

solved by conventional boundary element method (abstract, page 338). Specifically, Linkov et

al. disclose the missing element:

(c) said manipulation including solving equilibrium equations for each layer by the use of

a Fourier Transform method (Fourier Transform can be effectively employed to solve the typical

problems, page 346).

Linkov et al. disclose that problems for elastic multi-layered media with cracks arise in

rock mechanics (abstract, page 338). In order to do the hydraulic fracturing analysis and design

one of ordinary skill in the art would be motivated to solve these problems of elastic multi-

layered media, in addition to single-layered media, with cracks because they do arise in rock

mechanics.

It would have been obvious to one of ordinary skill in the art at the time the invention

was made to modify the teachings of GOHFER to incorporate the teachings of Linkov et al. to

obtain the invention as specified in claim 1 because by using Fourier transform, Linkov et al.

disclose an efficient method to reduce the multi-layered problem and solve it by conventional

boundary element method.

13-2.   Regarding claim 2, GOHFER further discloses the step of determining from said first set

of values dimensions of a hydraulic fracture is achieved using a mesh of elements (GOHFER is a

grid based model, section 3.4, pages 13-15).

13-3.   Regarding claim 3, it includes equivalent device limitation as recited in claim 1 based on

claim interpretation as detailed in section **11**, and is rejected based on the same reasoning of

claim 1.

13-4.   Regarding claim 13, GOHFER discloses a method comprising:

(a) obtaining a first data set (properties, etc., appendix I, pages 2-3),

(b) providing the first data set to a computer, the computer having a processor capable of executing instructions, the computer further having electronic storage means (RAM and hard disk, section 1.1, page 4) with stored equations comprising hydraulic fracturing relationships (model, section 4.2.2, page 28),

(c) computing by said processor a first set of values by manipulating said first data set using said stored equations (Executing, Chapter 4, pages 28-30),

(d) determining the dimensions of a hydraulic fracture intersecting several layers using a mesh of elements (GOHFER is a grid based model, section 3.4, pages 13-15),

(e) converting said first set of values into a set of output data, the output data representing fracture dimensions (Fracture Size vs. Time, appendix I, page 7) and pressures (Pressure vs. Time, appendix I, page 5) as a function of pumping time.

GOHFER fails to disclose expressly that (1) the hydraulic fracturing relationships comprising a Fourier Transform solution of multilayer equilibrium equations, (2) the solution employing at least one inversion process, and (3) the equations including a Green's function or influence matrix.

Linkov et al. propose an efficient method to solve problems for elastic multi-layered media with cracks, which arise in rock mechanics, using the Green function by means of Fourier transform and sweep-method. Having the Green function, one reduces the problem for damaged layers to solution of integral equation which is defined only on surfaces of cracks and can be solved by conventional boundary element method (abstract, page 338). Specifically, Linkov et al. disclose the missing elements:

(b) the hydraulic fracturing relationships comprising a Fourier Transform solution of multilayer equilibrium equations (Fourier Transform can be effectively employed to solve the typical problems, page 346), the solution employing at least one inversion process (Inverse transforms, page 346);

(c) the equations including a Green's function (use of the Green function, abstract, page 338).

Linkov et al. disclose that problems for elastic multi-layered media with cracks arise in rock mechanics (abstract, page 338). In order to do the hydraulic fracturing analysis and design one of ordinary skill in the art would be motivated to solve these problems of elastic multi-layered media, in addition to single-layered media, with cracks because they do arise in rock mechanics.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the teachings of GOHFER to incorporate the teachings of Linkov et al. to obtain the invention as specified in claim 13 because by using Green function and Fourier transform, Linkov et al. disclose an efficient method to reduce the multi-layered problem and solve it by conventional boundary element method.

13-5. Regarding claim 14, GOHFER further discloses:

(f) displaying the data for a user (The View Graph function allows WinParse to become a run-time monitor, section 5.7, page 43).

13-6. Regarding claim 15, GOHFER further discloses:

(f) sending the data to a remote site by way of a transmission medium (a networking environment, section 1.1.3, page 4).

13-7. Regarding claim 16, GOHFER further discloses:

(f) printing the output data (The Report button generates a report that can be viewed on the screen and sent to the printer, section 5.4.5, page 39).

13-8. Regarding claim 17, it is a device claim including equivalent method limitation as recited in claim 13, and is rejected based on the same reasoning of claim 13.

13-9. Regarding claim 18, GOHFER further discloses that said pre-recorded means is selected from the group of magnetic tape, a magnetic disk, an optical disk, a CD-ROM (hard disk, section 1.1, page 4).

13-10. Regarding claim 19, GOHFER discloses a report generated by illustrating a characteristic or set of values for a fracturing operation of a formation penetrated by a wellbore, said formation having a reservoir of oil or gas, comprising the steps of:

(a) obtaining a first data set (properties, etc., appendix I, pages 2-3),

(b) providing the first data set to a computer, the computer having a processor capable of executing instructions, the computer further having pre-recorded means (hard disk, section 1.1, page 4) with stored equations comprising hydraulic fracturing relationships (model, section 4.2.2, page 28),

(c) computing by said processor a first set of values by manipulating said first data set using said stored equations (Executing, Chapter 4, pages 28-30),

(d) determining the dimensions of a hydraulic fracture intersecting several layers using a mesh of elements (GOHFER is a grid based model, section 3.4, pages 13-15),

(e) converting said first set of values into a set of output data, the output data representing

fracture dimensions (Fracture Size vs. Time, appendix I, page 7) and pressures (Pressure vs.

Time, appendix I, page 5) as a function of pumping time, and

(f) generating a report (The Report button generates a report, section 5.4.5, page 39).

GOHFER fails to disclose expressly that (1) the hydraulic fracturing relationships

comprising a Fourier Transform solution of multilayer equilibrium equations, (2) the solution

employing at least one inversion process, (3) the equations including a Green's function or

influence matrix.

Linkov et al. propose an efficient method to solve problems for elastic multi-layered

media with cracks, which arise in rock mechanics, using the Green function by means of Fourier

transform and sweep-method. Having the Green function, one reduces the problem for damaged

layers to solution of integral equation which is defined only on surfaces of cracks and can be

solved by conventional boundary element method (abstract, page 338). Specifically, Linkov et

al. disclose the missing elements:

(b) the hydraulic fracturing relationships comprising a Fourier Transform solution of

multilayer equilibrium equations (Fourier Transform can be effectively employed to solve the

typical problems, page 346), the solution employing at least one inversion process (Inverse

transforms, page 346);

(c) the equations including a Green's function (use of the Green function, abstract, page

338).

Linkov et al. disclose that problems for elastic multi-layered media with cracks arise in

rock mechanics (abstract, page 338). In order to do the hydraulic fracturing analysis and design

one of ordinary skill in the art would be motivated to solve these problems of elastic multi-layered media, in addition to single-layered media, with cracks because they do arise in rock mechanics.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the teachings of GOHFER to incorporate the teachings of Linkov et al. to obtain the invention as specified in claim 19 because by using Green function and Fourier transform, Linkov et al. disclose an efficient method to reduce the multi-layered problem and solve it by conventional boundary element method.

Applicants' Arguments

14.   Applicants argue the following:

14-1.   Information Disclosure Statement

(1) "Applicant believes to have made an objective description of the possibility of the FracCADE software, as it had been developed at the time of the invention" (page 14/17, paper # 16).

(2) "In the attached second affidavit, Mr. Eduard Siebrits has prepared a document illustrating the P3D and PL3D models, which details what was the inventors understanding of the common knowledge and shows the main differences between the P3D and the PL3D models" (page 14/17, paper # 16).

14-2.   Claim rejections - 35 USC §112

(3) Rejections following paragraph 5.1, "An amendment to page 22 of the specification is hereby proposed to explain that the index notation is used" (pages 14-15/17, paper # 16).

(4) Rejections following paragraph 5.2, "by amending pages 24 and 25 so that the roots

alpha are now effectively layer-dependent" (page 15/17, paper # 16).

(5) Rejections following paragraph 5.3, "A new amendment to page 25 is proposed"

(page 15/17, paper # 16).

(6) Rejections following paragraph 5.4, "The phrase 'at least one of the following' has

been removed from claim 1" (page 15/17, paper # 16).

(7) Rejections following paragraph 5.5, "In claim 8, the term 'in real-time' has been

removed" (page 15/17, paper # 16).

(8) Rejections following paragraph 7, "Step (a) of claim 1 has been revised" (page 15/17,

paper # 16).

14-3.   Claim rejections - 35 USC §103

(9) "In the attached second affidavit Mr. Eduard Siebrits provides physical evidence of

the defaults of GOHFER model" (page 16/17, paper # 16).

(10) "The reference to the GOHFER model on page 4 has been slightly modified to avoid

the apparent contradiction between the specification and the affidavits" (page 16/17, paper # 16).

(11) "this (Linkov) model was not applicable for the case of cavities or cracks

intersecting the layers boundaries" (page 16/17, paper # 16).

(12) "The Linkov model is purely theoretical and to the best knowledge of the inventors,

has never been implemented" (page 16/17, paper # 16).

Response to Arguments

15.   Applicants' arguments have been fully considered.

15-1. Applicants' argument (1) is not persuasive. As admitted in lines 10-12, page 3 of the specification, "Currently, fracturing design is accomplished using PC-based programs such as, for example, Schlumberger's FracCADE simulator". Also notes, Applicants have shown an input screen of applying FracCADE software in Figures 18 and 19.

15-2. Applicants' arguments (2) and (9) are not persuasive because the PL3D model has not been expressly claimed.

15-3. Applicants' arguments (3) and (5) are not persuasive because the amendment introduces informalities as detailed in sections **5-1** to **5-3** above.

15-4. Applicants' argument (4) is not persuasive because the rejection is related to equation (9) at page 26 as detailed in section **7-1** above.

15-5. Applicants' arguments (6) and (7) are persuasive. The original claim rejections of claims 1 and 8 under 35 U.S.C. 112, first paragraph, in sections 5-4 and 5-5 of paper # 11 have been withdrawn.

15-6. Applicants' argument (8) is persuasive. The original claim rejections of claims 1-4 under 35 U.S.C. 112, second paragraph, in sections 7 to 7-2 of paper # 11 for indefiniteness have been withdrawn.

15-7. Applicants' argument (10) is not persuasive because the amendment objects Applicants' original admission and does not appear to have support in the original disclosure.

15-8. In response to Applicants' arguments (11) and (12) against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986). Furthermore,

Applicants only allege their conclusions about Linkov model without providing evidence why it
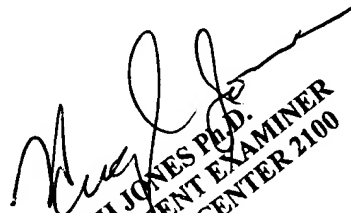
is not applicable.

Conclusion

16.   Any inquiry concerning this communication or earlier communications from the

Examiner should be directed to Herng-der Day whose telephone number is (703) 305-5269. The

Examiner can normally be reached on 9:00 - 17:30.

If attempts to reach the Examiner by telephone are unsuccessful, the Examiner's

supervisor, Kevin J Teska can be reached on (703) 305-9704. The fax phone numbers for the

organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding

should be directed to the receptionist whose telephone number is (703) 305-3900.

Herng-der Day
May 2, 2004